

Abstract

A device and method for manipulating a direction of motion of current carriers are presented. The device comprises a structure containing a two-dimensional gas of current carriers configured to define at least one region of inhomogeneity which is characterized by a substantially varying value of at least one parameter from the following: a spin-orbit coupling constant, density of the spin carriers, and a mobility of the gas. The device may be configured and operable to perform spin manipulation of a flux of the spin carrying current carriers to provide at least one of the following types of deviation of said spin-carrying current carriers: spin dependent refraction, spin dependent reflection and spin dependent diffraction on desired deviation angles of a direction of motion of the spin-carrying current carriers being incident on said at least one region of inhomogeneity. The device may also be configured and operable to allow emission of the current carriers from a diffusive region at one side of the region of inhomogeneity to a ballistic region at the opposite side of the region of inhomogeneity to provide the current carriers propagation in multiple directions in the ballistic region with a wide angular range of these directions.